THE CLAIMS

What is claimed is:

1. A method for eliminating an electrical potential difference between a slider body and a hard disk of a hard disk drive, the method comprising steps of:

detecting a flying-height spacing of the slider body between the slider body and the hard disk; and

applying a predetermined bias voltage between the slider body and the hard disk, the predetermined bias voltage including a DC component and an AC component and being based on the detected flying-height spacing of the slider body.

2. The method according to claim 1, wherein the step of detecting the flying-height spacing of the slider body includes a step of determining a minimum slider-to-disk clearance change from a design flying height of the slider at a frequency of the AC component as the DC component of the predetermined bias voltage is varied.

3. The method according to claim 1, wherein the step of detecting the flying-height spacing of the slider body includes a step of detecting a minimum electrodynamic response of the slider to a first harmonic of the AC frequency of the AC component as the DC component is varied.

4. The method according to claim 1, wherein the step of detecting the flying-height spacing of the slider body includes a step of detecting the flying-height spacing of the slider body using a Laser Doppler Vibrometer.

5. The method according to claim 1, wherein the step of applying a predetermined bias voltage between the slider body and the hard disk includes steps of:

sensing using a read element on the slider body a magnetic readback signal at a frequency of the AC component as a magnitude of the DC component is varied; and

detecting the flying-height spacing of the slider body based on a magnitude of the detected magnetic readback signal.

6. The method according to claim 5, wherein the AC component is a swept-frequency AC signal.

7. The method according to claim 5, wherein the AC component is a single-frequency AC signal.

8. The method according to claim 5, wherein the detected magnetic readback signal is a Position Error Signal relating to a position of the slider body with respect to the hard disk.

9. The method according to claim 1, wherein the step of detecting the flying height spacing of the slider body includes a step of determining a minimum interference between the slider body and the hard disk as the DC component is varied.

10. The method according to claim 1, wherein the predetermined bias voltage is applied to the slider body with respect to the hard disk.

11. The method according to claim 1, wherein the predetermined bias voltage is applied to the hard disk with respect to the slider body.

12. The method according to claim 1, wherein the step of applying the predetermined bias voltage includes a step of controlling a magnitude of the predetermined voltage based on the detected flying-height spacing of the slider body.

13. The method according to claim 12, wherein the step of detecting the flying height

spacing of the slider body includes a step of determining a minimum slider-to-disk clearance change from a design flying height of the slider at a frequency of the AC component as the DC component is varied.

14. The method according to claim 12, wherein the step of detecting the flying height spacing of the slider body includes a step of determining a minimum interference between the slider body and the hard disk at a frequency of the AC component as the DC component is varied.

15. A method for eliminating an electrical potential difference between a slider body and a hard disk of a hard disk drive, the method comprising steps of:

applying a variable DC bias voltage between the slider body and the hard disk;

detecting a minimum variation of current that flows on and off the slider body as the DC bias voltage is varied; and

applying a DC bias voltage corresponding to the variable DC bias voltage applied between the slider body and the hard disk when the minimum variation of current that flows on and off the slider body is detected.

16. A method for eliminating an electrical potential difference between a slider body and a hard disk of a hard disk drive, the method comprising steps of:

detecting a level of interference between the slider body and the hard disk; and

applying a predetermined bias voltage between the slider body and the hard disk, the predetermined bias voltage including a DC component and being based on the detected level of interference between the slider body and the hard disk.

17. The method according to claim 16, wherein the slider includes a magnetoresistive element, and

wherein the step of detecting the level of interference between the slider body and the hard disk is based on a step of detecting a minimum resistance of the magnetoresistive element as the DC component is varied.

18. The method according to claim 16, wherein the step of detecting the level of interference between the slider body and the hard disk is based on a step of detecting an output of a piezoelectric sensor sensing contact between the slider body and the hard disk as the DC component is varied.

19. The method according to claim 16, wherein the step of detecting the level of interference between the slider body and the hard disk is based on a step of detecting an output of an acoustic emission sensor sensing contact between the slider and the hard disk as the DC component is varied.

20. The method according to claim 16, wherein the predetermined bias voltage is applied to the slider body with respect to the hard disk.

21. The method according to claim 16, wherein the predetermined bias voltage is applied to the hard disk with respect to the slider body.

22. The method according to claim 16, wherein the step of applying the predetermined bias voltage includes a step of controlling a magnitude of the predetermined voltage based on the detected level of interference between the slider body and the hard disk.